In the comments which I added to the views of these eminent observers, wherein I mentioned those circumstances that seemed to me to tend in the direction of their support, I was, of course, unable to include, as I would if possible have done, a statement of the opinions of such noted authorities as Dr. Steube and Herr von Siebold, the results of whose investigations have so recently been given to the press, and which are cited in the article that elicits this letter. J. J. REIN

Marburg, Germany, February 8

Hovering of Birds

I REGRET that I did not notice until to-day that Mr. Airy, in his letter published in NATURE, vol. xxvii. p. 294, specially referred to "hovering with perfectly motionless wings" as being that for which an upward slant of wind is, as he believes, absolutely requisite to enable the bird to do so.

Is the term "hovering" applicable to the examples given by Mr. Airy of gulls and hawks floating as it were with motionless wing along hillsides and cliffs?

I have always associated "hovering" with the flapping or fluttering of the wings, as is invariably noticed when terns or hawks are looking for their prey either over land or water.

February 10 J. R.

Intelligence in Animals

IN his letter in NATURE, vol. xxvii. p. 337, Mr. J. Birmingham does not mention what kind of bear it is that throws down pieces of rock "in order to catch the bareins," as told by the Kamtschadales; but the Eskimos have a somewhat similar story of the white bear, when attacking the walrus, the largest of which, with their formidable tusks, Bruin generally avoids.

The circumstance was told me by an eye-witness, a very truthful and honest Eskimo of Repulse Bay. He said: "I and two or three other Innuit were attempting to approach some walrus in winter, lying on the ice close to the water, kept open by the strong current, in Fox's Channel. As we were getting near we saw that a large white bear was before us. He had reached in the most stealthy manner a high ridge of ice, immediately above where the walrus were lying; he then seized a mass of ice[1] in his paws, reared himself on his hind legs, and threw the ice with great force on the head of a half-grown walrus, and then sprang down upon it."

The Eskimos then ran up, speared the bear, and found the walrus all but dead, thus securing both animals. I should add that the bear threw the ice as if he was "left-pawed."

Kensington, February 10 J. RAE

WHILE spending the late winter months at Paignton, in Devon, I frequently watched, through a telescope, shore birds of various kinds stalking game on the low-tide sands. These abound with sand-eels, which lie, perfectly concealed, about an inch below the surface, and are caught in the following way by the gulls.

Standing close to the water's edge, the birds tread the wet sand into soft puddles by rapid alternate movements of their feet, and when a sand-eel, thus disturbed, makes a dart for the sea, he is instantly taken by a skilful but leisurely-looking snap of the beak.

Sand-eels bury themselves without leaving any marks on wet sand, and the gulls were always seen steadily and tentatively beating over the ground in the way I have described. They took, each, a fish a minute, perhaps, and impressed me with the idea that some thoughtful ancestral gull had deserved well of his race for the invention of such an easy logical way of picking up a living. D. PIDGEON

Holmwood, Putney Hill, February 7

The Sea-Serpent

ON reading the letter of W. Steadman Aldis in NATURE (vol. xxvii. p. 338) yesterday, I was reminded by a person present that some years ago, when in Orkney, I pointed out an appearance that most people unaccustomed to witness it might have taken for a great sea-monster. This was nothing more or less than some hundreds of cormorants or "scarps" flying in a continuous line close to the water, the deception being increased by the resemblance of a head caused by several "scarps" in a cluster *heading* the column, and by the "*lumpy*" seas of a swift tideway frequently intervening and hiding for an instant part of the black lines, causing the observer to—not unnaturally—imagine that the portions so hidden had gone under water. The speed of the cormorant on the wing may be fairly estimated at thirty miles an hour or more. J. RAE

Kensington, February 10

[1] It may be questioned how the bear could find a lump of detached ice. The strong current mentioned is constantly breaking up the ice into small pieces.

The "Zoological Record"

I SHOULD like to point out a slight error in the last impression of NATURE (p. 311). In your notice of the *Zoological Record*, 1881, it is stated that no separate paper seems to have appeared in 1881 exclusively devoted to the group *Octactiniæ*. I should mention that Prof. Nicholson's book on "Monticulipora," his paper on the skeleton of "Tubipora," and Mr. Wilson's paper on the development of "Renilla," all appeared in 1881, and were duly recorded by me. SYDNEY J. HICKSON

Anatomical Department, Museum, Oxford, February 5

SIEVE-TUBES

A CAREFUL examination by E. Russow (*Ann. Sci. Nat.* xiv. 1882, Nos. 3 and 4) of the structure and development of sieve-tubes leads him to the following general conclusions.

In all vascular plants examined, the sieve-tubes exhibit a remarkable agreement in structure, always expressed by the presence of callus. The sieve-punctation appears to be wanting in *Isoetes*, and possibly also in the Marattiaceæ. It is not, when present, confined to the sieve-tubes, but occurs also in the parenchyma of the secondary liber. It is often difficult to decide whether these punctations are actually perforated; but this is clearly the case wherever the sieve is traversed by callose cushions or striæ, or by connecting filaments; the presence of callus is not of itself sufficient to indicate perforation, for its formation certainly precedes the perforation of the membrane. In conifers the punctations between the sieve-tubes and the cells of the medullary rays are provided with callose cushions only on the side of the sieve-tubes, and the punctations remain closed.

The development, accumulation, and final disappearance of the callus indicate that it is not a product of transformation of the cellulose, but that it is separated from the contents of the sieve-tubes; its accumulation round the perforations is proportionate to the freedom and duration of the intercommunication that takes place through them; this communication probably continues as long as the striæ of the callus remain clearly developed, and ceases when these disappear, close up the sieve-pores, and end the function of the sieve-tubes.

In gymnosperms and vascular cryptogams, mucilaginous filaments are never to be seen traversing the callose cushions, although there is always a certain amount of communication between the elements of the sieve-tubes. The special function of the sieve-tubes is probably always maintained wherever striæ cross the callose cushions. The large number of plants in which the sieves are traversed, both in summer and winter, by mucilaginous filaments, and the large number in which no such filaments are at any time observable, contradicts the idea that the function of the callus is to close the sieve-pores during the dormant season.

Much less callus is deposited in the sieve-tubes of closed fibrovascular bundles, especially in permanent organs, than in those of open bundles which increase in thickness from the activity of their cambium. This difference corresponds to a difference in the nature of the contents, and in the duration of the activity of the sieve-tubes. While in gymnosperms and dicotyledons the active period of the sieve-tubes rarely exceeds two years, in monocotyledons and vascular cryptogams it lasts as long as the organ itself. A stem of *Alsophila*, at least

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twenty years old, had all the sieve-tubes at its base still in a state of full activity. In a stem of *Yucca aloifolia*, about fifteen years old, the sieve-tubes of all the fibro-vascular bundles, even the innermost, were active, and had their sieves covered with callus; but this was no thicker in the oldest than in the youngest tubes. In a stem of *Dracæna draco*, at least twenty years old, the callus had nearly or entirely disappeared from many of the sieve-tubes; but the plant was otherwise in bad health.

The callus is not a reserve-substance; for in gymnosperms and dicotyledons it often remains unchanged for years in the dead sieve-tubes, and even in leaves which have fallen in the autumn, and in aërial branches which die in the winter. It behaves rather like a secretory product; and this view is confirmed by the study of its development. The organised structure which the callus sometimes exhibits is not a sufficient objection to this view.

Under which class of organic compounds the callus should be placed cannot at present be determined with certainty. Its behaviour to iodine-reagents and to aniline blue appears to indicate an alliance with proteinaceous substances, and especially with nuclein; in this respect it differs altogether from the solid carbohydrates, such as cellulose and starch.

All sieve-tubes resemble one another in their contents, at least as far as relates to the parietal protoplasm and water. The mucilage, which is undoubtedly a non-granular protoplasm, only exists in large quantities in dicotyledons; no mucilaginous threads can be detected in monocotyledons or vascular cryptogams; in some monocotyledons there is simply an accumulation of mucilage in the sieve-tubes. The sieve-tubes of these two classes contain, on the other hand, a large quantity of smaller or larger refringent globules, which are also proteinaceous. Similar globules have been observed in the closed vascular bundles of *Hippuris vulgaris*.

Although starch is almost always present in the sieve-tubes of open vascular bundles, it is seldom to be met with in those of closed bundles. The diameter of the starch-grains is always greater than that of the canals which are clothed with callus, which renders it impossible for them to pass from cell to cell as long as the sieve-tubes are in an active state. The reddish-violet or brick-red colour which these starch-grains take with iodine reagents indicates the presence of a diastase among the contents of the sieve-tubes.

A series of observations on the same organs by E. Janczewski (*Ann. Sci. Nat.* xiv. 1882, Parts 1 and 2) was directed mainly to a comparison of their structure in the different primary groups of the vegetable kingdom.

In vascular cryptogams the elements of the sieve-tubes are not much larger than those of the parenchymatous tissue. They have no nucleus, and contain proteinaceous globules, adhering to the parietal protoplasm, and collected below the pores. Both the lateral and terminal walls have a larger or smaller number of pores. The membrane of these pores is never perforated, and prevents the intercommunication of the contents of adjoining elements; it is sometimes (as in *Pteris aquilina*) pierced by callose cylinders. The time of year exercises no influence on the sieve-tubes, which remain in the same condition through the whole of their existence.

In gymnosperms the life of the sieve-tubes may be divided into two periods, *evolutive* and *passive*. During the first period the pores in the walls of the young tube produce callose substance, and are transformed into sieves covered and closed by the callus; the elements of the tubes contain, at this period, parietal protoplasm. During the second period the tubes entirely lose their protoplasm, and become inert; but at its very commencement the sieves also lose their callus, and free communication is established between adjacent elements.

In dicotyledons the structure of the tubes is still more complicated; their life may be divided into four periods: *evolutive*, *active*, *transitional*, and *passive*. During the first period the cambial cell is not transformed immediately into an element of the tube, as in gymnosperms; it divides longitudinally, and produces on one side an element of the tubes, on the other side one or two cells of the liber-parenchyma. In the elements thus separated, the pores of the walls, or the entire horizontal septa, become covered with callus, and perforated into true sieves composed of a delicate network of cellulose and a callose envelope. The tubes now enter the second or active period, characterised by the sieve-structure and the free intercommunication of the protoplasmic contents of adjacent elements. It may last for months or years. In some cases the sieves are closed before winter by a fresh formation of callus, and open again in the spring. During this period the tubes contain protoplasm, a larger or smaller quantity of a mucilaginous proteinaceous substance, and sometimes starch. During the transitional period the tubes gradually lose their contents; the sieves are closed by callus, and reopen again by the complete absorption of the callose substance. They have now entered the passive period; they are completely inert, and contain no organic matter; the sieves are reduced to a delicate network of cellulose.

The development and behaviour of the sieve-tubes of monocotyledons resemble that of dicotyledons, and their life may be divided into the same four periods. But from the fact of the vascular bundles being closed, and having no cambial zone capable of forming fresh tubes, the active period of the tubes may last as long as the life of the organ which contains them requires it. The passive period is, in fact, rarely manifested. In our climate the sieve-tubes have the power of closing their sieves in autumn, and reopening them in spring. The elements of the tubes contain no starch or mucilaginous substance; and their parietal protoplasm only contains proteinaceous particles which seem to disappear in the spring, and to add to the density and refrangibility of the protoplasm.

CASSELL'S NATURAL HISTORY[1]

WITH the sixth volume, this well-illustrated account of the natural history of the animal kingdom is brought to a close, and the six handsome volumes leave nothing to be desired, so far as good covers inclosing excellent paper and beautiful typography are concerned. Indeed, the general get-up of the series is quite unexceptional, and as to the average value of the scientific contents we feel fully justified, on the strength of such contributors as Parker, Sharpe, Carpenter, Dallas, Sollas, &c., in strongly recommending the series to the majority of our readers.

From a purely scientific point of view, we regret the title selected by the Editor. He should not have launched so important a book in these days upon the sea of science under an obviously wrong title. The "Historia naturalis" embraces, as the Professor of Geology in King's College, London, well knows, something more than an account of the members of one of nature's kingdoms, and of their distribution in space and time. It is therefore certainly not scientific, and we take it as against modern culture to adhere to such a style. If, indeed, the eminent firm of publishers were to extend this natural history so that in another half-dozen volumes we should have an account of the equally interesting, and even more important vegetable kingdom, the title of the series would the more approach exactness.

Although in the title of his work the Editor has followed in the footsteps of the mere compiler, he has by no means

[1] "Cassell's Natural History." Edited by P. Martin Duncan, M.D. Lond., F.R.S., Professor of Geology, King's College, London. Volumes 1 to 6, illustrated. Volume 6. (London, Paris, and New York: Cassell, Petter, Galpin, and Co., 1883.)

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